Final Exam Review Sheet
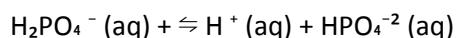
1. According to buffers and Le Châtelier's principle, what happens to the equilibrium when the pH drops and rises?

 $H_2PO_4^-$ (aq) + $\rightleftharpoons$ H^+ (aq) + HPO_4^{-2} (aq)

   - The equilibrium shifts to the left (when pH drops) and shifts to the right (when pH rises).

   - A buffer is a solution in which pH remains relatively constant when small amounts of acid or base are added

2. Referring back to the previous equation, what is true about acids and bases?

   - The hydrogen-ion acceptor in this buffer system is the hydrogen phosphate ion. The hydrogen-ion donor in this buffer system is the dihydrogen phosphate ion.

3. What will the effect be if NH_4Cl is added to the following mixture?

   $NH_3 + H_2O \rightleftharpoons NH^{+4} + OH^-$
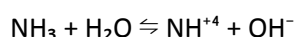
   - The production of NH_3 will increase.

4. What would shift the following reaction to the right?

 HNO_2 (aq) + H_2O(l) $\rightleftharpoons$ H_3O^+(aq) + NO_2^-(aq)
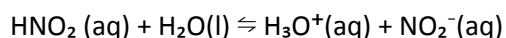
   - The addition of HNO_2 and the removal of NO_2^- .

5. The concentration of hydrogen ions can be monitored with an acid-base indicator. If the hydrogen ion concentration decreases, the color of the indicator will turn blue. What conditions would turn the color of the indicator to blue.

   CH_3COOH(aq) $\rightleftharpoons$ CH_3COO^- (aq) + H^+ (aq)
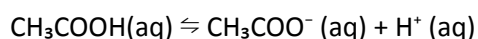
   - decreasing CH_3COOH, increasing CH_3COO^-

6. Acid reflux disease is a condition when gastric juices (primarily hydrochloric acid) in the stomach move back into the esophagus. Antacids are basic substances that neutralize the pH of gastric juices.

   What equation represents this reaction?

   - $3HCl$(aq) + $Al(OH)_3$ (s) $\rightleftharpoons$ $AlCl_3$ (aq) + $3H_2O$(l)
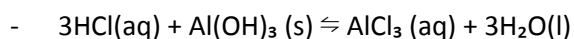
7. What is the pH of the titration of hydrochloric acid with aluminum hydroxide.

   - pH 7

8. What are the steps to perform a titration?

   - Record known volume and concentration of HCl.

   - Add a pH indicator.

   - Add NaOH to the acid.

   - Observe the pH indicator changing color.

   - Record known concentration of NaOH and determine the volume of NaOH required to neutralize acid.

9. How much HCl was neutralized by 0.75M NaOH if 20 mL of NaOH was required to reach the equivalence point.

   - 0.015 mol

10. Calculate the volume of 0.5M $Ca(OH)_2$ that is required to neutralize 20 mL of 0.75M H_2SO_4.

    - 30 mL

11. Classify the following salts as acidic, basic, or neutral when placed into water.

    - NaCl : neutral

    - Na_3PO_4 : basic

    - KCN : basic

    - NH_4NO_3 : acidic

12. What is true about the equivalence point and end point on a titration curve?

    - The end point does not always give the point where the reaction ends.

    - The equivalence point is the actual point when pH neutralization occurs.

13. What is buffering capacity?

    - the amount of acid/base that can be added before a significant change in pH occurs

14. Be able to identify the conjugate acid or base of a reaction.
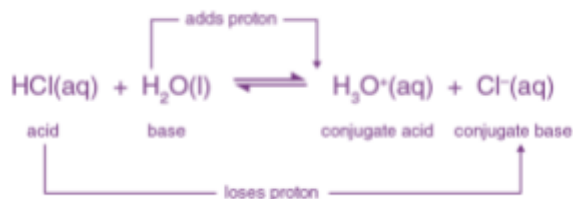
** Please review your midterm exam and past quizzes for the stoichiometry chapter.